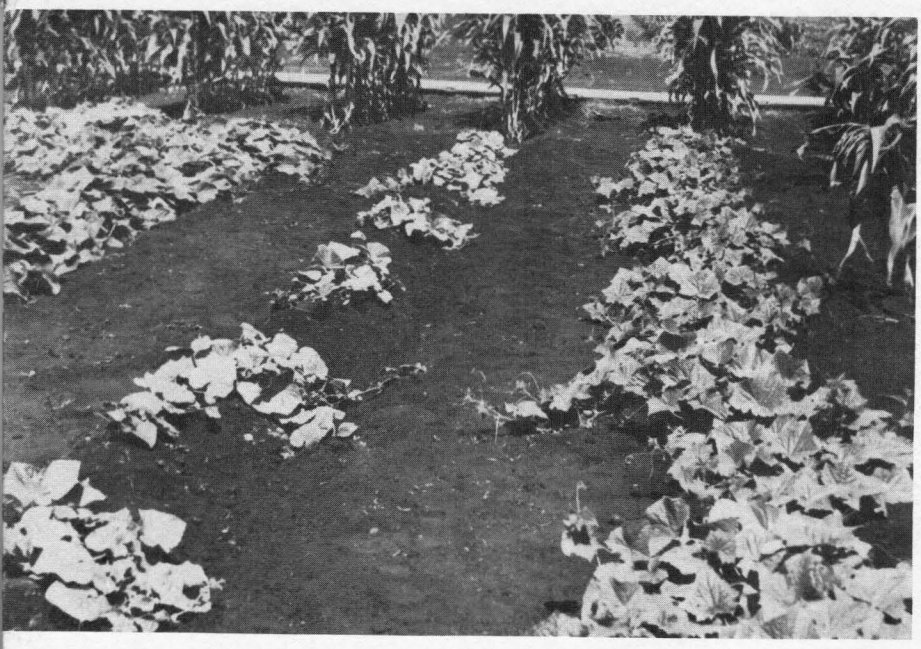
COST OF PRODUCING CUCUMBERS IN HAWAII



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ACKNOWLEDGMENTS

Appreciation is gratefully expressed for the assistance of Oahu farmers in giving information about their cucumber growing and to University of Hawaii Extension and Experiment Station workers for their advice.

PHOTOGRAPH ON COVER

Mosaic susceptible cucumber variety (center) with mosaic resistant HAES lines on either side.

SUMMARY

1. This report presents findings of a survey carried out in November and December, 1959, to determine the cost of producing cucumbers in Hawaii.

2. Cucumber growing in Hawaii is essentially small-scale and labor-intensive. The average planting is about 1 acre--twice a year--on the 1 out of 6 vegetable farms (780) which grow cucumbers.

3. Cucumbers are grown throughout the year--in sufficient quantities to satisfy local demand. Output fluctuates greatly from month to month. Two production peaks usually occur around May and October and a trough during December and January. Inclement weather and disease largely determine the wide monthly range in yield.

4. Demand for cucumbers is inelastic in the Honolulu metropolitan area. A good crop results in a sharp price drop and vice versa.

5. Typical expenditure involved in producing 1 acre of cucumbers in 1959 was $647.00 or about 6½ cents per pound for a 10,000-pound crop. Labor accounted for $300.00 or 46 percent of total costs.

6. Production costs per pound varied from 5.70 cents for a 12,000-pound (per acre) crop to 10.75 cents for a typical winter crop averaging 6,000 pounds per acre.

7. Returns from cucumber-growing vary considerably from month to month depending on the relationship between cost and price received, per pound, and quantity sold.

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COST OF PRODUCING CUCUMBERS IN HAWAII

J. A. Mollett[1/]

INTRODUCTION

This report presents findings of a survey carried out in November and December, 1959, to determine the cost of producing cucumbers in Hawaii. At present, Hawaii grows enough cucumbers to satisfy local demand throughout the year.[2/] Cucumbers "grown in Hawaii" are potentially an "export" crop for mainland markets in winter months. Better strains and improved disease control are necessary, however, before "potential" becomes "actual." Cost data given in this report are useful in any consideration of the comparative advantage of local versus mainland winter cucumber production.

This report also briefly analyzes the local supply-and-demand situation for cucumbers.

SOME FEATURES OF CUCUMBER PRODUCTION IN HAWAII[3/]

Cucumber production in Hawaii is essentially small-scale and labor-intensive. Roughly, 1 out of every 6 farms growing vegetables in the State (125 out of 780) plant cucumbers--usually two crops annually on the land used for this purpose. The typical vegetable farm is about 5 acres and is run with family labor. The average cucumber planting is about 1 acre--varying from 1/4 acre to 3 acres.

Cucumbers are ready for harvesting some 45 to 60 days after planting--the period to maturity depending largely upon variety and elevation. Harvesting continues for 20 to 35 days depending on yield, variety, and growing conditions. About 75 percent of locally grown cucumbers are of the Burpee's Hybrid variety. This cucumber is a first generation hybrid with vigorous vine growth and heavy yield.

The "Ilima Hybrid" variety recently developed by the Hawaii Agricultural Experiment Station[4/] is more resistant to the various strains of mosaic virus than Burpee's and other commercial varieties. Seed is still very limited, however. Also the development of a new variety combining some degree of resistance to powdery mildew with mosaic resistance promises to limit adoption of the "Ilima Hybrid."

1/ Assistant Agricultural Economist, Hawaii Agricultural Experiment Station, and Assistant Professor, College of Tropical Agriculture, University of Hawaii.

2/ Imports from the U. S. mainland are insignificant.

3/ This section is partly based on Cucumber Growing in Hawaii by Yukio Nakagawa, Extension Circular 384, University of Hawaii, August, 1957.

4/ "Disease Resistant Cucumbers for Hawaii," by J. C. Gilbert, Hawaii Farm Science, Vol. 7, No. 4, April, 1959, pp. 1-2.

The total area planted annually to cucumbers in recent years has been around 270 acres. Successive monthly plantings average about 20 acres. Yields fluctuate considerably between winter months and the rest of the year. For the State as a whole they typically fall within the range of 9,000 to 12,000 pounds per acre from early spring until late summer. Yields in winter are normally within the range of 5,000 to 8,000 pounds.

Figure 1 shows the pattern of production during 1954-58 together with the Honolulu wholesale prices of cucumber in that 5-year period. The figure shows two peaks of production around May and October and a "trough" around December-January. Prices, moving in an opposite direction to production, generally hit their peaks in January, February, and March and are lowest in May, June, and July.

Figure 2 shows the relationship which existed in 1958 between cucumber prices and production in terms of percentage changes. Basically, this figure reflects the fact that the Honolulu metropolitan area is a "pocket market" with an inelastic demand for cucumbers. Bumper crops of cucumbers in summer may yield less total revenue than relatively poor winter crops. The June, 1958, cucumber production was estimated by the Hawaii Cooperative Crop and Livestock Reporting Service at 500,000 pounds, of which 405,000 pounds were harvested with an average wholesale price of 5.4 cents per pound. Total revenue from June production amounted to $21,870. The corresponding revenue from March production (only 190,000 pounds) was $42,750--almost double.

It is necessary to take account of the seasonal pattern in demand to derive the true elasticity of demand (the ratio between percentage change in quantity and percentage change in price). However, it seems very likely that this pattern is fairly consistent, as Hawaii's climate is remarkably stable. Line DD' drawn on figure 2 thus probably reflects the current (inelastic) demand for cucumbers in Hawaii.

Annual production of cucumbers during 1950-58 has fluctuated between 3,285,000 pounds (in 1950) and 3,915,000 pounds (in 1952)--averaging 3,604,000 pounds. The area of land annually planted in cucumbers has steadily fallen as yields have risen. There were 371 acres in 1950 and 285 acres in 1958--about 30 percent fewer plantings with total annual production maintained.

Cucumbers are grown on all of the major islands in the Hawaiian chain. The relative importance of these islands in cucumber production is indicated in table 1.

The table shows the downward trend in the area annually planted to cucumbers on Oahu, Hawaii, and Maui since 1950. It also shows that Kauai's cucumber plantings have remained fairly steady. As a result of these divergent movements, Kauai has assumed greater prominence in local cucumber production.

Average yield per acre has improved markedly on all islands--mainly through widespread use of better seed, heavier application of fertilizers, and more effective control of plant pathogens. It is noticeable that cucumbers consistently give their heaviest yields on Hawaii and Kauai rather than on Oahu (which still supplies about 35 percent of total annual marketings). More favorable climatic conditions on the two neighbor islands appear to be largely responsible for higher yields.

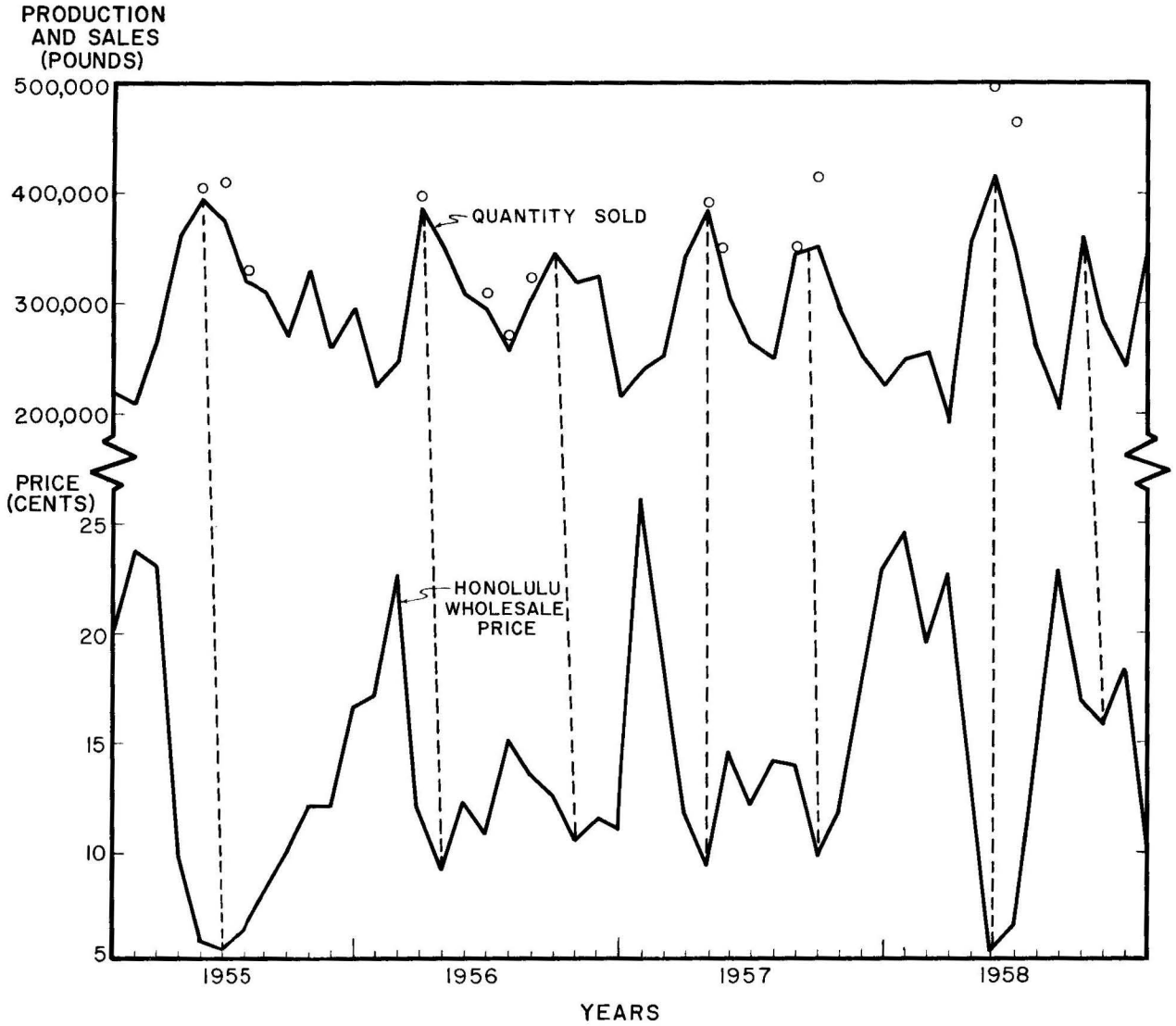

Figure 1. Production, sales, and wholesale prices (in Honolulu) of cucumbers, Hawaii, 1955-58 (monthly).

o = estimated quantity produced in months when not all produce was harvested.

Source: Statistics of Hawaiian Agriculture, Hawaii Cooperative Crop and Livestock Reporting Service Cooperating with United States Department of Agriculture, annual.

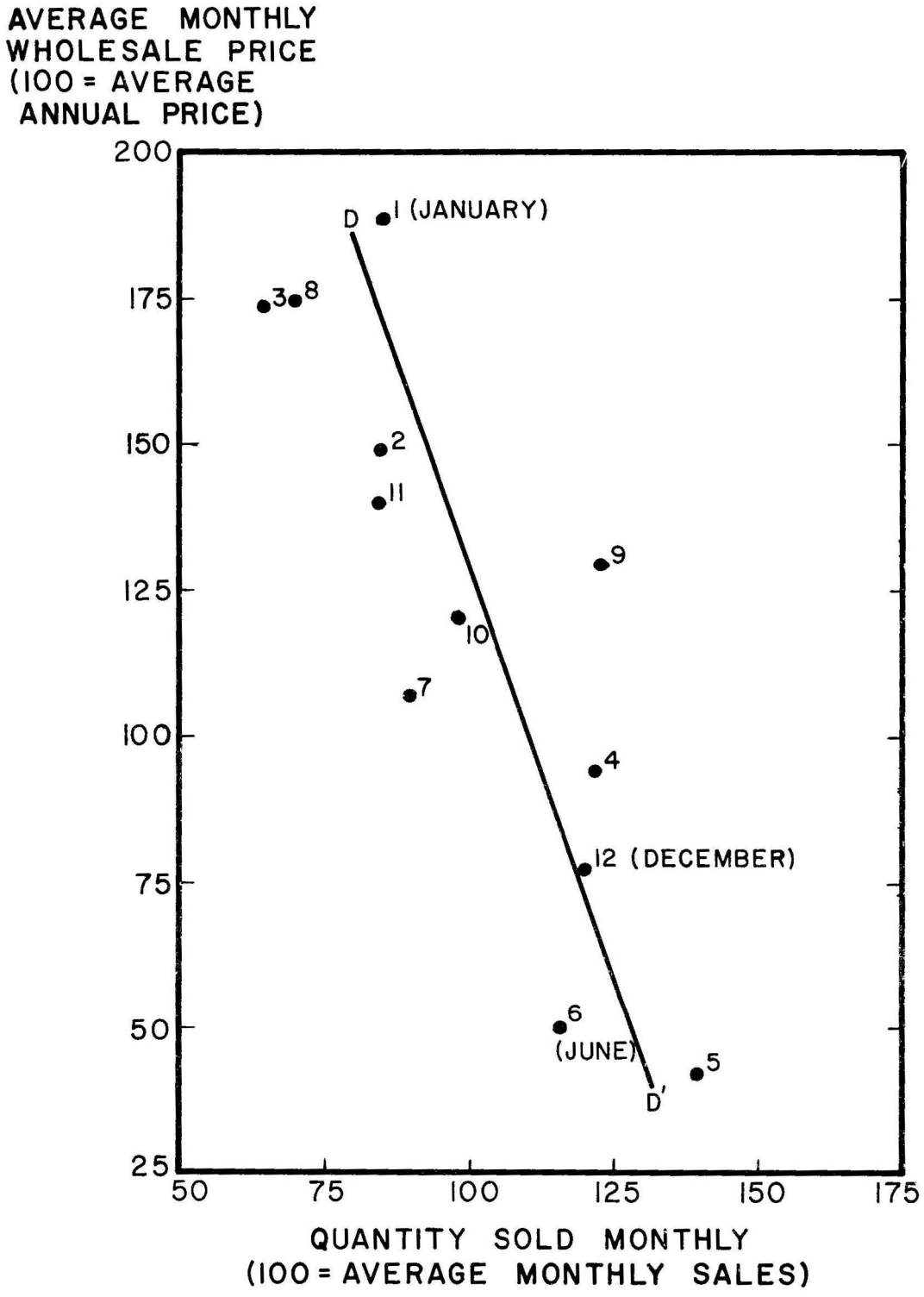

Figure 2. Relationship between wholesale price of cucumbers and quantity sold, Hawaii, 1958 (monthly).

Source: Derived from data contained in Statistics of Hawaiian Agriculture, annual.

Table 1. Acreage, average yield per acre, and total annual production of cucumbers on Oahu, Hawaii, Kauai, Maui, and Molokai, 1950-1958

Year	Acreage						Average yield per acre					Total production					
	Oahu	Hawaii	Kauai	Maui	Molokai	Total	Oahu	Hawaii	Kauai	Maui	State	Oahu	Hawaii	Kauai	Maui	Molokai	Total
	Acres					Acres	1,000 pounds				1,000 pounds	1,000 pounds					1,000 pounds
1950	146	124	34	64	3	371	6.3	12.7	8.8	7.2	8.9	925	1,575	300	460	25	3,285
1951	144	126	27	84	3	384	7.3	14.1	11.8	8.1	10.0	1,055	1,775	320	680	25	3,855
1952	173	69	33	74	5	354	9.8	15.7	12.0	9.5	11.0	1,695	1,085	395	705	35	3,915
1953	141	60	37	53	4	295	10.3	15.2	11.6	10.4	11.4	1,455	910	430	550	25	3,345
1954	165	51	40	36	2	294	8.7	16.7	15.5	10.4	11.5	1,430	850	620	460	25	3,385
1955	168	45	45	42	2	302	11.3	14.4	14.4	11.2	12.2	1,895	650	650	470	25	3,890
1956	146	75	34	43	3	301	11.1	14.0	14.0	10.5	12.1	820	1,050	475	450	30	3,665
1957	120	80	39	39	2	280	12.1	12.2	15.9	13.3	12.8	1,450	980	620	520	20	3,630
1958	113	57	53	33	2	258	12.7	16.8	15.4	14.7	14.4	1,440	960	815	485	20	3,720

Source: Statistics of Hawaiian Agriculture (annual).

COST OF PRODUCTION

Typical production costs have been prepared from information collected from Extension workers and from a random selection of six cucumber growers on Oahu. Costing procedure was relatively simple. Standard rates were charged for power and equipment (see table 2); family labor was charged at $1.00 per hour; and other inputs were charged at their actual market prices.

Table 2 summarizes typical expenditures involved in producing 1 acre of cucumbers (yielding 10,000 pounds) on Oahu in 1959. Costs are presented on a per acre and on a per pound basis. It is important to note that costs per acre tend to be fairly similar from one farm to another, and on the same farm at different times of the year. Costs per pound, however, vary greatly according to yield per acre. Figure 3 helps to make this latter point clear.

Table 2 shows that it cost $647.00 to produce 1 acre of cucumbers--or about $6\frac{1}{2}$ cents per pound (with a 10,000-pound crop). The most important single item of expense was labor at $300.00 per acre or 46 percent of total costs. One-half of this labor (150 hours) was spent harvesting and preparing cucumbers for market. Seedbed preparation and planting accounted for 20 hours; 110 hours were spent irrigating, weeding, fertilizing, and spraying the crop during the growing period; and 20 hours were used to ship or transport the cucumbers to market.

Materials (apart from gas and oil used in operating equipment) amounted to $188.50 per acre. Insecticides at $70.00 per acre were the most expensive single item, followed by crates ($45.00), fertilizers ($37.50), seeds ($24.00), and water ($12.00).

Rent at an annual rate of $40.00 per acre was charged at half this amount, as two crops were usually taken from the same plot each year. Taxes at $18.00 and sundries at $10.50, per acre, complete the cost picture.

Figure 3 illustrates wide differences which exist in the cost of producing 1 pound of cucumbers as yield per acre varies. The cost changes from about 5.70 cents per pound, with a 12,000-pound crop (a good summer crop) to 10.75 cents per pound, for a winter crop averaging only 6,000 pounds.

RETURNS

Table 3 compares cost data given in figure 3 with prices received by farmers for cucumbers in 1959 in an attempt to determine net returns per pound and per acre in different months.

Table 2. Typical cost of producing 1 acre of cucumbers (10,000 pounds) and 1 pound of cucumbers, Hawaii, 1959

Item	Unit	Unit cost	Units used	Cost	
				Per acre	Per pound
		Dollars		Dollars	Cents
Labor					
Seedbed preparation and planting	Hour	1.00	20	20.00	
Growing operations	Hour	1.00	110	110.00	
Harvesting, market preparation	Hour	1.00	150	150.00	
Shipping	Hour	1.00	20	20.00	
Total			300	300.00	3.00
Materials					
Insecticides	-	-	-	70.00	
Crates		.15	300	45.00	
Fertilizers	100 lbs.	3.75	10	37.50	
Seeds	Ounce	4.00	6	24.00	
Water	-	-	-	12.00	
Total				188.50	1.89
Equipment					
Tractor	Hour	1.25	28	35.00	
Truck	Hour	3.00	20	60.00	
Disc plow	Hour	.70	6	4.20	
Middle buster	Hour	.35	8	2.80	
Power spray	Hour	.80	10	8.00	
Total				110.00	1.10
Rent	Acre	40.00	$\frac{1}{2}$	20.00	.20
Taxes	-	-	-	18.00	.18
Sundries	-	-	-	10.50	.10
TOTAL				647.00	6.47

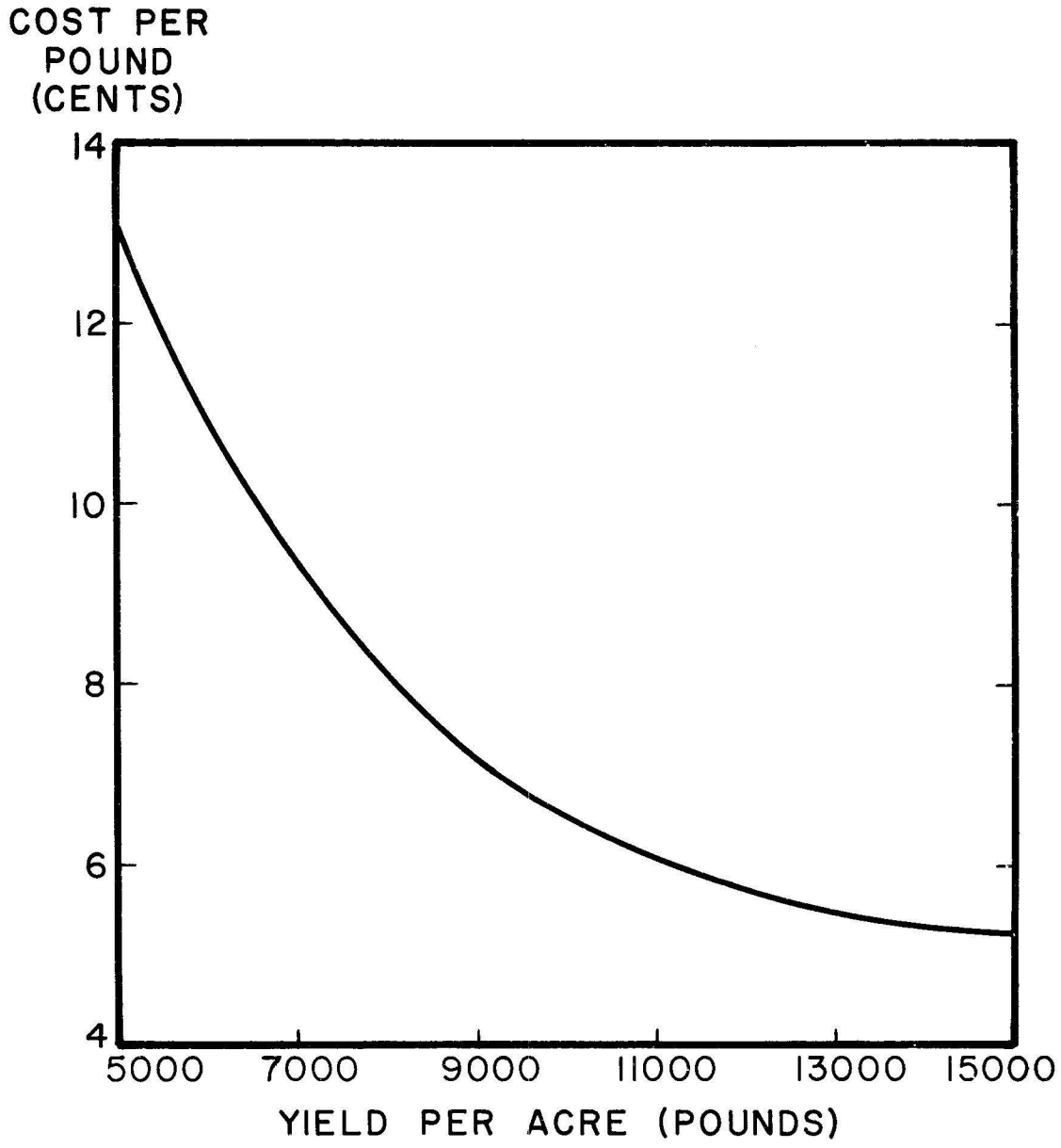

Figure 3. Estimated relationship between yield per acre and cost per pound of cucumbers, Hawaii, 1959.

Source: Based on cost data collected in November and December, 1959. It is assumed that cost per acre remains unchanged over a range of yields. Harvesting is the only important cost item to alter as yield changes--all other costs may be regarded as "sunken costs."

Table 3. Typical returns from cucumber production, per acre and per pound, Hawaii, 1959

Month	Price[a] per pound	Cost[b] per pound	Net returns	
			Per pound	Per acre
	Cents	Cents	Cents	Dollars
January	4.95	13.00	-8.05	-406.53
February	15.42	10.45	+4.97	+308.14
March	6.34	8.82	-2.48	-181.66
April	4.93	7.20	-2.27	-202.37
May	3.90	5.35	-1.45	-192.56
June	8.60	6.06	+2.54	+279.40
July	12.05	5.64	+6.41	+778.17
August	9.92	7.00	+2.92	+269.52
September	14.36	5.55	+8.81	+1,090.68
October	8.93	5.50	+3.43	+425.32
November	9.44	6.64	+2.80	+269.92
December	16.85	10.80	+6.05	+363.00

a/ Hawaii Farmers Co-operative Association, Honolulu.
b/ Estimated from survey data and from information given in Agricultural Production and Outlook (monthly), Cooperative Crop and Livestock Reporting Service, AMS, USDA, Agricultural Extension Service, University of Hawaii.

The most striking feature of this table is the wide fluctuation in monthly returns--from a loss of $406.00 per acre at one extreme to a gain of $1,091.00 per acre at the other. Such fluctuations result from a variety of factors--"shortages" or "surpluses" in market supply due to low or high yields or to changes in the number of suppliers, or to changes in demand (for example, in military and naval purchases). Cucumber-growing is revealed as a highly speculative business. High prices and returns from cucumber growing in January, 1958, for example, apparently led growers to speculate that similar conditions would occur the following January. The result--an unusually large supply of high-cost cucumbers in January, 1959, and an unusually low price, together with a heavy loss per acre.

Cucumber-growing in Hawaii is thus characterized by steady costs and very uncertain returns, per acre. The opening up of a new market on the Mainland, together with biological and cultural developments to lessen fluctuations in yield, should improve this unsatisfactory state of affairs.

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